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THE UNIVERSITY OF ALBERTA

A NORMATIVE STUDY OF TRACK AND FIELD EVENTS FOR THE ALBERTA SPECIAL GAMES

by

© KATHLEEN E. BRODERICK

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

AND RESEARCH IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR

THE DEGREE OF MASTERS OF ARTS

DEPARTMENT OF PHYSICAL EDUCATION

EDMONTON, ALBERTA

SPRING, 1974

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled A Normative Study of Track and Field Events for the Alberta Special Games submitted by Kathleen E. Broderick in partial fulfilment of the requirements for the degree of Masters of Arts.

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Date: April 17, 1974

ABSTRACT

The purpose of this study was to establish percentile norms for the Track and Field events in the Alberta Special Games. Subsidiary problems investigated the relationship between mental ability and motor performance and mental ability and sex.

The subjects consisted of the 1199 individuals participating in the Track and Field events in the 1972 and 1973 Alberta Special Games. The subjects were classified according to sex, age and level of competence. The age groups were designated as Junior, Intermediate and Senior. The participants were classified as educable mentally retarded or trainable mentally retarded on the basis of IQ.

Tables of norms were compiled for each of the Track and Field events with the performance scores calculated at every fifth percentile level. It was suggested that the variability of the normative tables could have been due to the wide range within the three age groups and the two levels of competence.

The relationship of mental ability and motor performance and mental ability and sex was determined by "t" tests and the .05 level of significance was accepted for this study. On the basis of this study, it was concluded that the educable mentally retarded performed significantly better than the trainable mentally retarded on all but three events and that the educable and trainable mentally retarded boys performed at a significantly higher level than the educable and trainable girls respectively.

It is recommended that the classification system for the Alberta Special Games be more clearly defined. Also the norms should be interpreted in light of the population from which they were derived due to the variability of the classification system.

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CHAPTER I

STATEMENT OF THE PROBLEM

INTRODUCTION

There is today a growing interest in the motor performance of the mentally retarded. Recent researchers, Howe (1959), Francis and Rarick (1959), and Corder (1966), have indicated that the mentally retarded are capable of demonstrating marked achievements in motor performances. The Alberta Special Games were first conceived in 1970 to provide the mentally retarded student in Alberta with experiences similar to those of normal children. It was hoped that the mentally retarded student would benefit from the social aspect of the games, that their motor performances in selected activities would improve and that the physical education programs within the schools would be upgraded as a direct result of the Games.

In order to evaluate the motor proficiency of the mentally retarded it is essential that their performances be evaluated. The present study provides the mentally retarded participant with percentile norms in the Track and Field events.

The literature also suggests that there is considerable variability of performances within the mentally retarded population. However, there is substantial evidence that the greater the retardation, the more retarded the motor performances. This study attempts to examine the relationship of motor performance and mental ability of the children competing in the Alberta Special Games.

THE PROBLEM

The purpose of this study is to establish percentile norms for the Track and Field events in the Alberta Special Games.

SUB-PROBLEMS

1. To determine the relationship between motor performance and mental ability.
2. To determine the relationship between motor performance and sex.

JUSTIFICATION

The literature indicates that the usefulness of scores is enhanced if they are accompanied by a set of norms. This study establishes the first norms for the Track and Field events in the Alberta Special Games. These norms are of practical value to the teachers in that they provide a basis for comparison of performances in the different events. The norms are of value to the students in that they provide possible achievement goals. The norms can be compared with similar data that may be collected in succeeding years to determine improvement in performances. Also information can be derived from the results regarding the relationship of motor performance to mental ability and sex.

LIMITATIONS

The study was limited by the following:

1. The track meets were held in two different facilities; therefore the track conditions and the field conditions were not the same

for each year.

2. There was a limited number of participants in some of the events.

3. The results of the two hundred metre, three hundred metre and the four hundred metre distance runs were collected for one year only.

4. The accuracy and the consistency of the results could have been affected by the particular nature of the individuals participating in the track meet.

DELIMITATIONS

The study was limited to all males and females participating in the Track and Field events at the 1972 and 1973 Alberta Special Games.

DEFINITION OF TERMS

1. Junior Classification. The Junior Classification includes participants from six to twelve years of age as of July 1st 1972 and July 1st 1973.

2. Intermediate Classification. The Intermediate Classification includes participants from thirteen to fifteen years of age as of July 1st 1972 and July 1st 1973.

3. Senior Classification. The Senior Classification includes participants from sixteen years and over as of July 1st 1972 and July 1st 1973.

4. Educable Mentally Retarded (EMR). The Educable Mentally Retarded have IQ's ranging from fifty to eighty as classified by the Alberta school systems.

5. Trainable Mentally Retarded (TMR). The Trainable Mentally Retarded have IQ's ranging from twenty-five to fifty as classified by the Alberta school systems.

6. Norms. An experimentally derived index used to compare the achievement or status of individuals with the status of a similar group.

CHAPTER II

REVIEW OF THE LITERATURE

INTRODUCTION

The literature indicates that there are a limited number of studies dealing specifically with the motor performance of the mentally retarded. Many of these studies compare the motor performance of the mentally retarded with that of normal subjects. This review, however, is concerned only with the motor performance of the mentally retarded and with those studies which use track and field events to assess motor performance.

The review of literature is organized into five major sections. The first deals with the motor performance of the mentally retarded. The second section also considers the motor performance of the mentally retarded, but this review is restricted to motor performance determined by the Oseretsky Motor Development Scale. The third part discusses the effect of programs of physical education on the motor performance of the mentally retarded. A review of the literature concerning the classification of the mentally retarded follows, and lastly, the literature dealing with measurement in physical education.

MOTOR PERFORMANCE OF THE MENTALLY RETARDED

Several authors have compared the performances of mentally retarded subjects of different etiological classifications on a variety of motor skill tasks. In 1942, Heath investigated the per-

formance of 170 mentally retarded male subjects on the Rail-Walking Test. When the familial and the non-familial groups were compared, it was found that the familial group was superior in rail-walking performance. Also a significant positive relationship was found between mental age and Rail-Walking Test scores within the familial group; whereas no significant correlation for these two variables was found for the non-familial group.

A similar study was conducted by Heath in 1953 using the Rail-Walking Test and seven tests of simple motor performance. His findings revealed that the familial group was superior to the non-familial group in the Rail-Walking Test and in five of the motor performance tests. In most of the motor performance tests there was a positive, moderate correlation between motor performance and mental age in both etiological groups. However the Rail-Walking Test correlated highly with mental age in the familial group and only slightly in the non-familial group.

Although the evidence was by no means conclusive, Heath hypothesized that the motor test that shows the greatest difference in behavior when applied to the familial and non-familial group would be be one which requires the more complex action pattern. Heath concluded that what the Rail-Walking Test measures in the familial group is quite different from what it measures in the non-familial group.

As part of a more extensive study conducted by Francis and Rarick in 1959, motor performance tests including running speed, agility run, standing long jump and softball throw were used in an attempt to

describe the motor characteristics of twenty-three institutionalized children including both familial and mongoloid groups with IQ's ranging from fiften to fifty. The results revealed that both groups showed greatest retardation in the agility run. Also the mongoloids were consistently more retarded in motor performance than the familial.

The review of literature revealed that two studies have included track and field events in the battery of test items designed to describe the motor characteristics of the mentally retarded.

Howe (1959) compared the performance of forty-three mentally retarded children and the same number of public school children of matched chronological age on a variety of motor skill tasks including the fifty yard dash and the softball throw. He found that the normal children were consistently superior to the mentally retarded. He also found that within the range of performance, there was considerable overlapping of the two groups.

In the study previously cited, Francis and Rarick (1959) used various track and field items to describe the motor characteristics of 284 mentally retarded children with IQ's ranging from fifty to ninety. Their results showed that the differences between the levels of performance of the mentally retarded followed the same general age and sex patterns as those observed for normal children. They found that the means on most measures for both boys and girls were two to four years behind the published age norms of normal children and that

the discrepancy between the normal and the mentally retarded tended to increase at each successive age level. The study revealed that performance scores showed some unusual peaks at certain age levels, particularly the nine and eleven year old mentally retarded girls. Rarick et al (1959) suggested that this indicates the potential for higher levels of motor achievement exists among mentally retarded children.

MOTOR PERFORMANCE OF MENTALLY RETARDED CHILDREN AS DETERMINED BY THE OSERETSKY MOTOR PERFORMANCE SCALE

Various authors have used an adaptation of the Oseretsky Motor Development Scale to investigate the relationships between motor proficiency and age, sex and intelligence. The Oseretsky Motor Development Scale is a maturational scale of motor proficiency consisting of eighty-five tests and gives a motor age for children four to sixteen years of age.

Several research studies have found a relationship between motor proficiency and mental ability. Faller, as cited in Rabin (1957), using the Lincoln Adaptation of the Oseretsky Motor Development Scale, studied thirty mentally defective girls with IQ's ranging from forty-five to sixty-nine. She concluded that there was some relationship between motor and mental development since the lower IQ range, forty-five to fifty-two, accounted for the majority of"motor idiots" while the upper IQ range, sixty-one to sixty-nine, had the greatest variability in scores and the fewest scores in the bottom category. Similiar results were obtained by Malpass (1963) and by Distenfano, Ellis and Sloan (1958).

Using the Vineyard Adaptation of the Oseretsky Motor Development Scale, Cassel (1949) found that an endogenous group of mentally defectives performed significantly higher than a comparable exogenous group.

In 1951, Sloan studied the relationship of motor performance and mental ability as determined by the Lincoln Oseretsky Motor Development Scale. As a subsidiary objective, the study was designed to determine whether etiological groups could be differentiated on the basis of motor proficiency. A group of ten familial and ten undifferentiated mental defective subjects with IQ's ranging from forty-five to ninety were matched for age and sex with twenty normal subjects. The results indicated a relationship between motor proficiency and mental ability with the mental defectives significantly inferior to the normal children. However, contrary to previous findings, Sloan found no significant differences on the Lincoln Oseretsky Motor Development Scale between the familial and the undifferentiated groups.

In a study comparing the performances of institutionalized and non-institutionalized retarded children and normal children on the Lincoln Oseretsky Motor Development Scale, Malpass (1960) obtained results similar to those reported by Sloan (1951). Malpass found that the motor proficiency of retarded children was highly related to intellectual ability but no significant differences were revealed between institutionalized and non-institutionalized retarded children.

Contrary results were reported by Rabin (1957) in a study using sixty endogenous mentally defective children. Rabin found that motor proficiency was not significantly related to intelligence but

felt that this may have been due to an unsufficiently controlled Examiner-Institution variable.

Sloan (1951) and Rabin (1957) also investigated the relationship between motor proficiency and sex as determined by the Lincoln Oseretsky Motor Development Scale, and found that motor proficiency did not vary as a function of sex. The Rabin study (1957) indicated that motor proficiency was significantly related to age.

EFFECTS OF PHYSICAL EDUCATION PROGRAMS

Several authors, Oliver (1958), Corder (1966), Solomon and Pangle (1967) and Chasey and Wyrick (1971) have attempted to determine the effect of a program of physical education on the motor performance of the mentally retarded. Oliver (1958) provided an experimental group of twenty EMR subjects with a systematic and progressive program of physical activity. The control group, consisting of twenty EMR subjects, and matched as nearly as possible for age, intelligence, size and physical condition, continued with their regular two physical education lessons per week. At the end of ten weeks, the experimental group showed significant improvement in motor proficiency.

In 1966, Corder designed a physical education program which included such items as the twenty-five yard dash, the long jump, four hundred yard run and wind sprints. He then tested his twenty-four EMR subjects on the American Association of Health, Physical Education and Recreation Youth Fitness Test which consisted of the fifty yard dash, the long jump, softball throw and the six hundred yard run and found a significant improvement in scores.

A similar study was conducted by Solomon and Pangle (1967),

also using the AAPHER Youth Fitness Test to assess the physical fitness of forty-two EMR boys. The extent of improvement from the program was substantial. Six weeks following the termination of the study, the subjects continued to demonstrate improvement.

Chasey and Wyrick (1971) developed a physical education program for a group of sixty institutionalized EMR subjects using the Oseretsky Motor Development Scale as a measure of motor proficiency. They found that the subjects improved significantly on test components composed of gross motor tasks.

CLASSIFICATION

There appears to be general agreement that retarded children are a very heterogenous group both in their behavior and in the causes of their deficiencies. Many researchers in the field of mental retardation have attempted to develop a system of terminology and classification.

Several authors, Tredgold and Soddy (1963) and Brison (1967) indicated that an early classification system grouped the defectives according to the severity of their symptoms with either social competence or the measured level of intelligence being the sole criterion. Terms such as "idiot", "imbecile", "feebleminded", and "moron" were quite common, and were further subdivided into "high", "medium" and "low" grade. Later, according to Robinson and Robinson (1965), the labels "mild subnormality", "moderate subnormality", and "severe subnormality" were recommended but were not widely accepted.

Benton (1964), Brison (1967), Davitz, Davitz and Forge (1964) and Robinson and Robinson (1965) reported on a system of terminology and classification used at the present time. According to Benton (1964), a medical classification and a behavioral classification exist within this scheme. The medical classification has etiological and pathogenetic implications, while the behavioral classification, which describes mental retardation in terms of measured intelligence and adaptive behavior, has implications for social adaptibility, education and vocational training.

Strauss and Lehtinen (1955) proposed that within the medical classification, the terms "endogenous" and "exogenous" be used to describe the deficiencies, while Benton (1964) advocated the use of the labels "familial" and "brain injured". Within the behavioral classification, Robinson and Robinson (1965) suggested the labels "borderline", "mild" "moderate", "severe" and "profound". Fitzgibbon (1967) and Robinson and Robinson (1965) reported that most educators prefer to use educable mentally retarded and trainable mentally retarded to describe the defectives. According to Fitzgibbon (1967) the distinction made between the educable and trainable programs are currently based upon the child's potential to benefit from instruction in academic subjects and his potential to participate in community life. Today, all these terms are found throughout the literature.

MEASUREMENT IN PHYSICAL EDUCATION

Clarke (1946) in his book on measurement in physical

education stated that:

> The fundamental function of a physical educator is to understand each child's needs in order to give him adequate guidance and to adapt programs to meet his needs. If these functions are to be accomplished efficiently, measurement is indispensable, for orderly progress cannot be achieved without the guidance that intelligent use of measurement provides.

Mathews (1963) supported this by saying:

> Indeed the application of scientific knowledge to determine the kind and and amount of physical activity needed to meet the individual child's needs is imperative to the further improvement of physical education programs.

Bovard, Cozens and Hagman (1949) defined measurement as evaluative proceedures which are precise, objective, quantitative and whose findings are capable of statistical treatment. The results of measurement are not in themselves significant or self-explanatory but become so after appraisal and interpretation in light of all available data.

Bovard, et al (1949) also indicated that the lack of available and representative norms has resulted in inadequate achievement standards in motor performances and has restricted the usefulness of tests for motor ability and development. Barrow and McGee (1966) defined norms as an experimentally derived index which enables teachers to compare the achievement or status of their students with those of a similar group. According to Mathews (1963) and Barrow and McGee (1966) scores that have an accompanying set of norms are much more useful

than those that do not. Bovard, et al (1949), and Mathews (1963) indicated that the keynote to good norms is adequate sampling plus a sufficient number of cases to reduce the standard error of estimate to a negligible quantity. Barrow and McGee (1966) stated that norms should not be accepted at face value but should be based on a particular type of group which is well identified. Clarke (1946) cautioned that the establishment and application of norms for all subjects in a particular designation does not allow for the many factors that makes individuals "normally" different. Also, in establishing norm tables a sufficiently large number of cases usually is not available to adequately describe individuals at the upper and lower ends of the scale so that typical performances can be determined.

CHAPTER III

METHODS AND PROCEDURES

THE SAMPLE GROUP

The sample included the male and female population participating in the Track and Field events in the 1972 and 1973 Alberta Special Games. Data were collected for 736 male participants and 463 female participants ranging in age from six to forty-five years. The population was representative of thirty-seven schools throughout the Province of Alberta. Tables of norms were established for the performance of 1199 subjects.

CLASSIFICATION

Each participant was classified according to sex, age group and level of competence. The age groups were designated as Junior, Intermediate and Senior and the participants were classified as educable mentally retarded or trainable mentally retarded on the basis of IQ.

SELECTION OF ACTIVITIES

The Track and Field events differed between the three age groups. The Juniors participated in the fifty metre sprint, the ball throw, the running long jump and the soccer kick. The Intermediates competed in the one hundred metre sprint, the two hundred metre distance run, the softball throw, the long jump and the high jump. The Seniors participated in the same events as the Intermediates except that the

two hundred metre distance run was replaced by a three hundred metre and four hundred metre distance run.

DESCRIPTION OF EVENTS

1. Track Events

(a),(b) Fifty Metre Sprint, One Hundred Metre Sprint - The participants ran the fifty metre sprint and the one hundred metre sprint in heats with a maximum of six runners per heat. The participants started behind the official starting line and were not allowed to use starting blocks. The starter's command was "On your marks" and "Go" at which time the starter dropped a flag in a vertical path. One watch was used to time each runner and all times were recorded only when the participant crossed over the finishing line.

(c),(d),(e) Two Hundred Metre, Three Hundred Metre, Four Hundred Metre Distance Run - The participants ran the two hundred metre, three hundred metre and four hundred metre run on mass, lining up across the official starting line. The starter used the same command as in the one hundred metre sprint. Times to the nearest one tenth of a second were recorded.

2. Field Events

(a) Soccer Kick - Each participant had two attempts to kick a standard Soccer Ball between the goal posts from a ten yard distance. If the participant was successful, one additional kick was taken from a five yard increased distance. The participant continued to move back at five yard intervals until unsuccessful.

(b) Softball Throw - A ten inch rubber softball was used by the Juniors and a twelve inch ball was used by the Intermediate and Senior competitors. The participants were allowed an approach and any style of single arm throw. The best of two throws was recorded and measurement was taken from the point where the side line and the throwing line crossed to the point on the side line opposite the place where the ball landed.

(c) Long Jump - The participant ran fifteen to twenty strides prior to jumping from or before a take-off board. The jumper was allowed two attempts and the longest jump was recorded. The jump was measured from the front edge of the take-off board to the nearest point in the pit where any part of the body touched.

(d) High Jump - The jumper was allowed to use any style of jump but was required to have a one foot take off. The participant could attempt each new height or pass. Two consecutive failures at any height disqualified the athlete.

OFFICIALS

The 1972 Track and Field meet was conducted by students attending the James Fowler High School, Calgary, Alberta. A mock Track and Field meet was held prior to the Special Games at which time measuring procedures were standardized.

The 1973 Track and Field meet was conducted by students attending Harry Ainley High School, Edmonton, Alberta and experienced track officials. Instructions were given prior to the meet in order to

standardize measuring procedures.

CALIBRATION OF INSTRUMENTS

The stop watches for the Track meets were calibrated at the University of Alberta and found to be accurate within three tenths of a second for five minutes. All the watches contained dial markings of one-tenth of a second.

The measuring tapes for the Field events were compared to a hundred foot steel tape and found to be accurate.

TREATMENT OF THE DATA

The scores from the 1199 participants were analyzed by the computer at the University of Alberta using the APL A988 program.

1. The size of the sample, the maximum and minimum scores, range, mean standard deviation and median were calculated. This information was recorded for each event, for the boys and the girls in the three age groups, and for the two levels of competence.

2. Performance scores were calculated at every fifth percentile level.

3. The "t" test was used to examine the relationship of mental ability and motor performance and mental ability and sex.

4. The .05 level of significance was accepted for all "t" tests.

CHAPTER IV

RESULTS AND DISCUSSIONS

PERCENTILE NORMS

The norms were calculated in the form of percentiles with performance scores recorded at every fifth percentile level. The performance scores shown for the zero and hundreth percentiles represent the poorest individual performance and the best individual performance in a particular event.

The percentile scores represent percentile points and the corresponding values on the transformed scale represent percentile ranks. For example, if 75 percent of the Junior EMR girls scored more than 9.5 seconds in the fifty metre sprint, then 9.5 would be the 75th percentile and 75 would be the corresponding percentile rank.

The percentile norms for the Track and Field events, excluding the Soccer Kick, are presented in Table I through to Table XII. The Tables are organized by sex, age classification and level of competence. The number of participants, range, mean and standard deviation are presented for each event.

The norms in this study must be interpreted with some caution. The sample group from which the norms were established represents a select segment of the mentally retarded population in Alberta and includes both institutionalized and non-institutionalized students. Also the range within each age group and within each level of competence may be responsible for the variability of scores. Certainly the performances from a six year old EMR participant with an IQ

of fifty will be quite different from the performances of a twelve year old with an IQ of eighty.

"t" TESTS

A series of "t" tests were used to examine the relationship between mental ability and motor performance and the relationship between mental ability and sex for the Juniors Intermediate and Seniors. The 0.5 level of significance was accepted for all "t" tests.

TABLE I

PERCENTILE SCORES FOR JUNIOR EMR GIRLS

PERCENTILE	50 METRES (SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)
100	8.0	115-10	11-6
95	8.3	95-0	10-1
90	8.7	82-6	9-5
85	9.0	76-3	9-0
80	9.3	71-3	8-10
75	9.5	67-0	8-7
70	9.7	63-9	8-4
65	10.0	61-3	8-2
60	10.1	58-9	7-11
55	10.3	56-3	7-8
50	10.4	53-9	7-5
45	10.6	51-3	7-2
40	10.7	49-0	6-11
35	10.8	47-0	6-7
30	11.0	45-0	6-4
25	11.3	42-2	5-11
20	11.7	38-9	5-5
15	12.0	33-4	4-11
10	12.4	28-7	4-4
5	12.8	25-8	2-8
0	17.6	11-0	1-2
N	86	80	69
RANGE	9.6	104-10	10-4
MEAN	10.6	55-7	7-10
S.D.	1.5	20-4	2-1

TABLE II

PERCENTILE SCORES FOR JUNIOR TMR GIRLS

PERCENTILE	50 METRES (SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)
100	8.4	92-0	9-9
95	9.2	78-8	8-8
90	9.6	63-8	7-8
85	9.8	57-2	7-2
80	10.1	52-8	6-8
75	10.3	49-2	6-4
70	10.6	46-1	6-1
65	10.8	43-6	5-10
60	11.1	40-8	5-7
55	11.4	37-5	5-4
50	11.8	35-6	5-2
45	12.3	34-1	5-0
40	12.6	32-8	4-9
35	12.8	31-2	4-7
30	13.1	29-7	4-2
25	13.3	27-11	3-9
20	13.8	25-11	3-4
15	14.4	22-8	3-0
10	15.1	19-10	2-7
5	16.2	17-3	1-11
0	18.0	2-8	1-6
N	48	52	36
RANGE	8.6	89-4	8-3
MEAN	12.2	39-5	5-3
S.D.	2.2	18-0	1-9

TABLE III

PERCENTILE SCORES FOR INTERMEDIATE EMR GIRLS

PERCENTILE	100 METRES (SECONDS)	200 METRES (SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)	HIGH JUMP (FEET-INCHES)
100	14.5	36.8	128-0	12-3	4-2
95	15.1	38.7	110-2	11-6	4-1
90	15.6	39.9	100-0	10-9	3-11
85	15.9	40.3	93-2	10-4	3-10
80	16.3	40.7	86-8	10-1	3-9
75	16.6	41.0	79-11	9-10	3-8
70	16.9	41.3	76-9	9-7	3-7
65	17.2	41.6	74-7	9-4	3-6
60	17.5	42.2	71-8	9-1	3-4
55	17.7	42.9	68-0	8-11	3-3
50	17.9	43.1	64-4	8-8	3-2
45	18.1	43.2	61-10	8-5	3-1
40	18.3	43.4	59-6	8-3	2-11
35	18.6	43.6	56-10	8-0	2-10
30	19.0	43.8	54-0	7-10	2-9
25	19.3	44.7	50-5	7-8	2-8
20	19.6	49.4	47-6	7-5	2-7
15	20.0	53.5	45-2	7-0	2-5
10	20.3	58.1	41-5	6-8	2-4
5	20.9	62.0	35-9	5-10	2-3
0	29.5	67.8	24-8	4-5	2-2
N	98	37	102	111	81
RANGE	15	31	103-4	7-10	2-1
MEAN	18.3	45.3	67-7	8-8	3-1
S.D.	2.4	7.0	22-1	1-6	0-5

TABLE IV

PERCENTILE SCORES FOR INTERMEDIATE TMR GIRLS

PERCENTILE	100 METRES (SECONDS)	200 METRES (SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)	HIGH JUMP (FEET-INCHES)
100	15.0	41.4	94-6	10-7	3-6
95	15.6	41.5	70-2	10-4	3-5
90	16.7	42.1	66-5	9-0	3-4
85	17.8	43.9	62-7	8-3	3-2
80	18.3	45.0	57-9	7-10	3-1
75	18.7	46.2	55-9	7-6	2-11
70	19.0	47.3	53-10	7-2	2-9
65	19.3	47.8	50-8	7-0	2-8
60	19.7	48.1	48-2	6-9	2-7
55	20.0	50.8	46-7	6-6	2-6
50	20.7	51.7	45-0	6-3	2-5
45	21.2	52.2	43-5	6-0	2-4
40	21.5	52.8	41-10	5-10	2-3
35	21.8	53.4	40-3	5-7	2-2
30	22.3	53.8	38-8	5-3	2-1
25	23.0	54.2	35-6	4-11	2-0
20	24.1	58.8	32-4	4-7	1-11
15	24.8	60.0	29-2	4-0	1-10
10	27.8	62.1	26-10	3-4	1-9
5	28.9	65.3	24-7	2-9	1-8
0	36.0	69.6	19-9	2-4	1-8
N	44	23	63	59	50
RANGE	21	28.2	74-9	8-3	1-10
MEAN	21.6	51.7	46-2	6-4	2-7
S.D.	4.4	7.5	14-8	2-0	0-41

TABLE V

PERCENTILE SCORES FOR SENIOR EMR GIRLS

PERCENTILE	100 METRES (SECONDS)	300 METRES (MINUTE:SECONDS)	400 METRES (MINUTES:SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)	HIGH JUMP (FEET-INCHES)
100	15.5	1:00.1	1:26.0	95-0	12-10	3-11
95	15.7	1:00.4	1:26.6	89-7	11-8	3-10
90	16.1	1:01.1	1:27.5	83-7	11-0	3-9
85	16.5	1:02.9	1:29.3	79-10	10-10	3-8
80	16.8	1:04.6	1:31.0	75-4	10-8	7-7
75	17.1	1:05.4	1:32.8	73-10	10-5	3-6
70	17.4	1:07.1	1:34.5	70-10	10-3	3-5
65	17.7	1:11.9	1:36.3	66-0	10-1	3-4
60	18.0	1:12.6	1:38.0	65-0	9-10	3-3
55	18.3	1:13.4	1:45.5	64-1	9-7	3-2
50	18.6	1:14.1	1:49.0	62-10	9-5	3-0
45	18.8	1:15.9	1:52.5	60-7	9-2	2-11
40	19.1	1:16.6	1:54.7	58-10	8-9	2-10
35	19.4	1:17.4	1:55.8	57-2	8-2	2-8
30	19.7	1:18.1	1:57.0	55-10	7-11	2-7
25	20.0	1:18.9	1:58.2	54-6	7-9	2-6
20	20.4	1:19.6	2:00.0	51-4	7-7	2-4
15	21.1	1:20.4	2:03.5	44-11	7-5	2-3
10	22.0	1:26.1	2:55.5	40-10	7-3	2-2
5	22.9	1:29.9	2:56.0	31-1	6-10	2-1
0	24.0	1:30.2	2:57.3	28-4	6-1	1-9
N	45	15	14	45	35	29
RANGE	8.5	30.1	1:32.3	66-8	6-9	2-2
MEAN	18.9	1:03.6	1:53.6	62-5	9-2	2-11
S.D.	2.1	8.8	29	16-1	1-6	0-4

TABLE VI

PERCENTILE SCORES FOR SENIOR TMR GIRLS

PERCENTILE	100 METRES (SECONDS)	300 METRES (MINUTE:SECONDS)	400 METRES (MINUTES:SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)	HIGH JUMP (FEET-INCHES)
100	15.2	1:05.0	1:34.0	124-6	8-8	3-10
95	16.2	1:05.1	1:35.0	90-10	8-7	3-8
90	17.2	1:05.5	1:37.0	72-0	8-0	3-5
85	17.6	1:05.9	1:40.0	63-8	7-6	3-1
80	17.9	1:06.3	1:43.2	61-4	7-2	2-11
75	18.3	1:06.7	1:44.0	58-11	6-11	2-10
70	19.3	1:07.5	1:44.8	55-10	6-8	2-9
65	19.6	1:08.3	1:45.6	51-2	6-5	2-8
60	19.9	1:09.1	1:46.4	48-0	6-2	2-7
55	20.3	1:09.9	1:47.2	46-2	5-11	2-6
50	20.7	1:10.7	1:48.0	44-4	5-8	2-5
45	21.1	1:12.3	1:52.0	42-3	5-4	2-4
40	21.7	1:13.3	1:56.0	40-3	5-1	2-2
35	22.5	1:14.1	1:58.7	38-0	4-8	2-1
30	23.3	1:21.1	2:00.0	35-8	4-4	2-0
25	23.7	1:22.7	2:01.3	33-5	3-11	1-10
20	24.0	1:24.3	2:02.7	31-1	3-5	1-8
15	24.4	1:25.9	2:06.0	28-8	3-1	1-6
10	24.9	1:33.5	2:10.0	26-0	2-8	1-5
5	26.2	1:39.1	2:24.0	18-10	2-4	1-4
0	34.5	1:39.8	2:25.0	10-4	2-3	1-3
N	41	16	16	74	28	49
RANGE	19.3	34.8	51	114-2	6-5	2-7
MEAN	21.3	1:04.9	52.9	47-2	5-6	2-7
S.D.	3.7	10.6	13.8	20-2	3-2	0-5

TABLE VII

PERCENTILE SCORES FOR JUNIOR EMR BOYS

PERCENTILE	50 METRES (SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)
100	7.6	174-11	10-10
95	8.2	143-3	10-8
90	8.7	128-10	10-2
85	8.8	121-3	10-0
80	9.0	112-7	9-10
75	9.1	106-11	9-7
70	9.3	102-5	9-5
65	9.4	98-1	9-2
60	9.5	92-5	8-11
55	9.7	87-10	8-9
50	9.9	84-7	8-6
45	10.0	80-10	8-3
40	10.2	78-1	7-11
35	10.3	75-8	7-8
30	10.5	70-6	7-4
25	10.7	66-1	7-1
20	10.9	59-11	6-10
15	11.2	55-0	6-7
10	11.4	50-8	6-4
5	12.0	38-4	5-5
0	14.7	26-2	4-3
N	115	138	91
RANGE	7.1	148-9	6-7
MEAN	10.0	87-7	8-4
S.D.	1.2	30-9	1-6

TABLE VIII

PERCENTILE SCORES FOR JUNIOR TMR BOYS

PERCENTILES	50 METRES (SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)
100	7.4	109-0	11-5
95	8.7	90-8	10-6
90	9.1	80-1	10-0
85	9.5	77-10	9-7
80	9.6	68-5	9-3
75	9.8	64-4	8-10
70	10.0	62-1	8-6
65	10.2	59-10	8-3
60	10.3	57-7	8-1
55	10.6	55-2	7-10
50	10.8	52-6	7-7
45	11.0	50-4	7-4
40	11.3	48-5	7-1
35	11.6	46-2	6-10
30	11.9	42-2	6-7
25	12.2	38-2	5-5
20	12.5	35-5	4-10
15	13.0	28-10	4-1
10	13.5	23-1	3-5
5	14.5	20-3	2-9
0	16.0	18-5	1-7
N	77	75	80
RANGE	8.6	90-7	9-10
MEAN	11.9	53-1	7-2
S.D.	1.7	20-6	2-4

TABLE IX

PERCENTILE SCORES FOR INTERMEDIATE EMR BOYS

PERCENTILE	100 METRES (SECONDS)	200 METRES (SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)	HIGH JUMP (FEET-INCHES)
100	12.2	33.3	185-6	16-0	5-1
95	13.2	34.5	152-5	14-5	4-11
90	14.0	35.1	145-3	14-0	4-8
85	14.4	36.2	133-5	13-7	4-6
80	14.8	36.7	129-0	13-2	4-3
75	15.2	37.1	124-6	12-9	4-1
70	15.6	38.4	119-5	12-5	4-0
65	15.7	38.6	114-2	12-1	3-11
60	16.0	38.8	108-6	11-9	3-9
55	16.2	38.9	105-5	11-5	3-8
50	16.5	39.1	100-6	11-2	3-7
45	16.8	39.2	95-0	10-9	3-6
40	17.1	39.5	90-11	10-5	3-5
35	17.5	39.8	85-9	10-2	3-3
30	17.8	40.1	80-3	9-11	3-2
25	18.1	40.8	76-10	9-8	3-1
20	19.0	42.6	74-0	9-5	2-10
15	19.6	43.0	63-8	8-11	2-8
10	20.0	43.7	57-3	8-5	2-5
5	21.3	44.7	51-1	7-6	2-3
0	24.1	45.0	45-0	6-5	2-1
N	96	26	107	89	93
RANGE	11.9	11.7	140-6	9-7	3-0
MEAN	16.9	38.4	99-11	11-2	3-7
S.D.	2.3	2.9	31-5	2-1	0-6

TABLE X

PERCENTILE SCORES FOR INTERMEDIATE TMR BOYS

PERCENTILE	100 METRES (SECONDS)	200 METRES (SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)	HIGH JUMP (FEET-INCHES)
100	13.9	37.1	129-6	14-3	4-1
95	15.2	38.3	110-9	12-3	3-11
90	15.5	39.0	98-11	11-4	3-6
85	15.8	41.4	94-2	10-9	3-5
80	16.1	41.8	89-4	10-5	3-4
75	16.3	42.1	83-7	10-2	3-3
70	16.6	43.5	80-5	9-11	3-2
65	16.9	45.5	78-0	9-8	3-1
60	17.2	46.2	75-4	9-5	3-0
55	17.4	46.9	72-7	9-2	2-11
50	17.7	48.1	67-11	8-11	2-10
45	18.1	49.5	62-1	8-7	2-9
40	18.4	51.4	59-4	8-1	2-8
35	18.8	56.3	56-3	7-5	2-7
30	19.2	52.7	52-5	6-10	2-6
25	19.8	54.4	49-8	6-3	2-4
20	20.7	54.9	45-10	5-5	2-3
15	21.4	55.5	39-3	4-7	2-1
10	22.7	56.3	35-11	4-2	1-10
5	24.7	57.7	33-6	2-9	1-8
0	29.1	60.1	23-4	1-10	1-7
N	97	28	75	72	55
RANGE	15.2	23	106-2	12-5	2-6
MEAN	18.7	47.6	67-9	8-2	2-11
S.D.	3.1	6.5	24-4	2-8	0-5

TABLE XI

PERCENTILE SCORES FOR SENIOR EMR BOYS

PERCENTILE	100 METRES (SECONDS)	300 METRES (MINUTE :SECONDS)	400 METRES (MINUTE :SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)	HIGH JUMP (FEET-INCHES)
100	13.3	0:47.9	1:00.6	186-9	15-8	5-4
95	13.6	0:49.3	1:00.7	171-4	14-11	4-11
90	14.0	0:50.0	1:01.0	167-3	14-7	4-7
85	14.4	0:50.4	1:01.3	158-1	14-4	4-6
80	14.7	0:50.7	1:01.7	150-6	14-1	4-4
75	14.9	0:52.3	1:02.2	148-7	13-9	4-3
70	15.2	0:53.1	1:02.9	137-7	13-6	4-2
65	15.4	0:53.7	1:05.0	135-11	13-2	4-1
60	15.6	0:54.2	1:06.0	134-3	12-11	3-11
55	15.8	0:54.6	1:09.0	132-3	12-5	3-10
50	16.0	0:56.2	1:10.1	129-3	11-11	3-8
45	16.2	0:57.2	1:11.2	125-10	11-6	3-7
40	16.5	0:59.2	1:13.9	114-0	11-2	3-6
35	16.8	0:59.8	1:14.4	109-7	10-10	3-5
30	17.1	1:01.4	1:17.3	104-6	10-4	3-3
25	17.4	1:03.0	1:21.4	98-4	9-11	3-2
20	17.8	1:06.9	1:26.4	92-8	9-4	3-1
15	18.2	1:09.3	1:27.5	90-1	8-9	2-11
10	18.8	1:10.4	1:29.5	79-6	8-2	2-10
5	19.5	1:12.2	1:30.1	72-1	7-1	2-9
0	20.1	1:13.7	1:30.2	64-0	2-10	2-8
N	60	35	21	73	71	71
RANGE	6.8	25.8	29.5	122-9	12-10	2-8
MEAN	16.2	58.1	1:12.6	124-0	11-6	3-10
S.D.	1.7	7.6	10.9	30-6	2-6	0-57

TABLE XII

PERCENTILE SCORES FOR SENIOR TMR BOYS

PERCENTILE	100 METRES (SECONDS)	300 METRES (MINUTE:SECONDS)	400 METRES (MINUTES:SECONDS)	SOFTBALL THROW (FEET-INCHES)	LONG JUMP (FEET-INCHES)	HIGH JUMP (FEET-INCHES)
100	13.4	0:50.8	1:07.0	145-5	15-3	4-11
95	14.3	0:51.1	1:10.2	128-6	13-10	4-7
90	14.8	0:53.0	1:12.6	116-0	12-8	4-5
85	15.2	0:53.8	1:13.7	108-6	11-11	4-2
80	15.6	0:59.4	1:14.7	101-10	11-8	4-0
75	16.0	1:01.1	1:16.0	95-10	11-5	3-10
70	16.4	1:02.3	1:17.4	89-10	11-2	3-8
65	16.7	1:03.1	1:19.2	83-10	10-10	3-7
60	16.9	1:03.9	1:21.3	81-1	10-4	3-6
55	17.2	1:04.4	1:23.4	79-4	9-10	3-5
50	17.4	1:05.1	1:28.5	77-6	9-6	3-4
45	17.8	1:05.9	1:30.4	73-11	9-2	3-3
40	18.1	1:06.4	1:31.8	67-4	8-8	3-2
35	18.5	1:07.0	1:33.3	63-8	8-1	3-1
30	18.7	1:07.5	1:35.4	60-9	7-6	3-0
25	19.0	1:08.0	1:37.0	58-2	6-11	2-11
20	19.3	1:08.2	1:38.4	51-0	5-10	2-10
15	20.1	1:08.5	1:49.1	45-8	5-3	2-9
10	21.1	1:08.8	2:00.3	42-8	4-7	2-8
5	22.8	1:10.3	2:02.4	31-10	3-8	2-7
0	37.0	1:10.5	2:06.6	23-6	2-0	2-6
N	73	33	29	73	47	62
RANGE	23.6	19.7	59.6	121-11	13-3	2-5
MEAN	18.0	1:03.5	1:31.6	76-7	9-2	3-5
S.D.	3.4	5.7	17.8	28-5	3-1	0-5

MENTAL ABILITY AND MOTOR PERFORMANCE

The relationship between mental ability and motor performance for the Junior, Intermediate and Senior girls is found in Table XIII.

The results show a "t" value which is significant at the .05 level for every event except the Senior three hundred metres and the Senior four hundred metres. The times for these events are very close with the TMR recording a slightly faster time in the four hundred metres. This may have been due to the small number of competitors in these events.

The relationship between mental ability and motor performance for the Junior, Intermediate and Senior boys is found in Table XIV. The "t" values indicate that the Junior soccer kick is the only event that the two groups are not significantly different.

These results are similar to those found by Heath (1942), Francis and Rarick (1959) and Faller (1948).

MENTAL ABILITY AND SEX

Table XV and Table XVI show the relationship between mental ability and sex for the educable mentally retarded and the trainable mentally retarded respectively. It appears that the EMR boys are significantly better than the EMR girls and the TMR boys are significantly better than the TMR girls with regard to motor performance in all events. This does not support the results reported by Sloan (1951) or Rabin (1957) who found that motor proficiency did not vary as a function of sex.

TABLE XIII

THE RELATIONSHIP OF MENTAL ABILITY AND MOTOR PERFORMANCE OF EMR AND TMR GIRLS

EVENT	EMR $\bar{X}$	TMR $\bar{X}$	t
JUNIOR 50 METRES (SECS.)	10.6	12.2	5.01*
JUNIOR SOFTBALL (FT-INS)	55-6	39-4	4.67*
JUNIOR LONG JUMP (FT-INS)	7-1	5-3	2.37*
JUNIOR SOCCER KICK (FT-INS)	17-4	13-7	2.77*
INTERMEDIATE 100 METRES (SECS)	18.3	21.6	5.79*
INTERMEDIATE 200 METRES (SECS)	45.3	51.7	3.34*
INTERMEDIATE SOFTBALL (FT-INS)	67-6	46-2	6.81*
INTERMEDIATE HIGH JUMP (FT-INS)	3-1	2-6	6.23*
INTERMEDIATE LONG JUMP (FT-INS)	8-7	6-3	8.68*
SENIOR 100 METRES (SECS)	18.8	21.3	3.86*
SENIOR 300 METRES (SECS)	73.6	74.9	.37
SENIRO 400 METRES (SECS)	113.6	112.9	.09
SENIOR SOFTBALL (FT-INS)	62-4	47-2	4.29*
SENIOR LONG JUMP (FT-INS)	9-2	5-6	8.40*
SENIOR HIGH JUMP (FT-INS)	2-9	2-5	3.33*

* significant at the .05 level.

TABLE XIV

THE RELATIONSHIP OF MENTAL ABILITY AND MOTOR PERFORMANCE

OF EMR AND TMR BOYS

EVENT	EMR $\bar{X}$	TMR $\bar{X}$	t
JUNIOR 50 METRES (SECS)	10.0	11.2	5.79*
JUNIOR SOFTBALL (FT-INS)	87-6	53-1	11.40*
JUNIOR LONG JUMP (FT-INS)	8-4	7-2	7.07*
JUNIOR SOCCER KICK(FT-INS)	19-5	17-9	1.28
INTERMEDIATE 100 METRES (SECS)	16.9	18.7	4.58*
INTERMEDIATE 200 METRES (SECS)	38.4	47.6	6.66*
INTERMEDIATE SOFTBALL (FT-INS)	99-9	67-7	7.43*
INTERMEDIATE HIGH JUMP (FT-INS)	3-6	2-9	6.85*
INTERMEDIATE LONG JUMP (FT-INS)	11-2	8-2	7.80*
SENIOR 100 METRES (SECS)	16.2	18.0	3.71*
SENIOR 300 METRES (SECS)	58.1	63.5	3.30*
SENIOR 400 METRES (SECS)	72.6	91.6	4.33*
SENIOR SOFTBALL (FT-INS)	124-0	76-6	9.72*
SENIOR LONG JUMP (FT-INS)	11-6	9-2	4.56*
SENIOR HIGH JUMP (FT-INS)	3-8	3-4	4.21*

* significant at the .05 level.

TABLE XV

THE RELATIONSHIP OF MENTAL ABILITY AND SEX

FOR EMR GIRLS AND BOYS

EVENT	EMR GIRLS $\bar{X}$	EMR BOYS $\bar{X}$	t
JUNIOR 50 METRES (SECS)	10.6	10.0	3.17*
JUNIOR SOFTBALL (FT-INS)	55-6	87-6	8.42*
JUNIOR LONG JUMP (FT-INS)	7-1	8-4	1.94*
JUNIOR HIGH JUMP (FT-INS)	17-4	19-5	1.77*
INTERMEDIATE 100 METRES (SECS)	18.3	16.9	4.09*
INTERMEDIATE 200 METRES (SECS)	45.3	38.4	6.67*
INTERMEDIATE SOFTBALL (FT-INS)	67-6	99-9	8.55*
INTERMEDIATE LONG JUMP (FT-INS)	3-1	3-6	5.96*
INTERMEDIATE HIGH JUMP (FT-INS)	8-7	11-2	9.70*
SENIOR 100 METRES (SECS)	18.8	16.2	6.98*
SENIOR 300 METRES (SECS)	73.6	58.1	6.31*
SENIOR 400 METRES (SECS)	113.6	72.6	5.92*
SENIOR SOFTBALL (FT-INS)	62-4	124-0	12.50*
SENIOR LONG JUMP (FT-INS)	9-2	11-6	5.01*
SENIOR HIGH JUMP (FT-INS)	2-9	3-8	7.86*

* significant at the .05 level.

TABLE XVI

THE RELATIONSHIP OF MENTAL ABILITY AND SEX

FOR TMR GIRLS AND BOYS

EVENT	TMR GIRLS $\bar{X}$	TMR BOYS $\bar{X}$	t
JUNIOR 50 METRES (SECS)	12.2	11.2	1.72*
JUNIOR SOFTBALL (FT-INS)	39-4	53-1	3.89*
JUNIOR LONG JUMP (FT-INS)	5-3	7-2	2.77*
JUNIOR SOCCER KICK (FT-INS)	13-7	17-9	3.74*
INTERMEDIATE 100 METRES(SECS)	21.6	18.7	4.55*
INTERMEDIATE 200 METRES (SECS)	51.7	47.6	2.09*
INTERMEDIATE SOFTBALL (FT-INS)	46-2	67-7	6.12*
INTERMEDIATE LONG JUMP (FT-INS)	2-6	2-9	3.06*
INTERMEDIATE HIGH JUMP (FT-INS)	6-3	8-2	4.40
SENIOR 100 METRES (SECS)	21.3	18.0	4.78
SENIOR 300 METRES (SECS)	74.9	63.5	4.90*
SENIOR 400 METRES (SECS)	112.9	91.6	4.14*
SENIOR SOFTBALL (FT-INS)	47-2	76-6	7.24*
SENIOR LONG JUMP (FT-INS)	5-6	9-2	5.56*
SENIOR HIGH JUMP (FT-INS)	2-5	3-4	8.60*

* significant at the .05 level.

CHAPTER V

SUMMARY AND CONCLUSIONS

SUMMARY

The purpose of this study was to establish percentile norms for the Track and Field events in the Alberta Special Games. Subsidiary problems investigated the relationship between mental ability and motor performance; and mental ability and sex.

The subjects consisted of the 1199 individuals participating in the Track and Field events in the 1972 and the 1973 Alberta Special Games. The subjects were classified according to sex, age and level of mental competence. The age groups were designated as Junior, Intermediate and Senior. The participants were classified as educable mentally retarded or trainable mentally retarded on the basis of IQ.

Tables of norms were compiled for each of the Track and Field events with the performance scores calculated at every fifth percentile level. The relationship of mental ability and motor performance and mental ability and sex was determined by "t" tests and the .05 level of significance was accepted.

CONCLUSIONS

Within the limitations of the study the following conclusions were made:

1. It was possible to establish percentile norms for the Track and Field events in the Alberta Special Games.

2. The educable mentally retarded girls performed significantly better than the trainable mentally retarded girls on all events except the Senior three hundred metres and the Senior four hundred metres.

3. The performance of the educable mentally retarded boys was significantly superior to the performance of the trainable mentally retarded boys on all events except the Junior soccer kick.

4. The EMR and TMR boys performed at a significantly higher level than the EMR and TMR girls respectively.

5. The six groups were significantly different as determined by motor performance.

RECOMMENDATIONS

As a result of the information gained in the study, the following recommendations were made:

1. The results of this study should be made available to the schools involved in the Alberta Special Games to provide achievement goals for the teachers and for the students.

2. The norms should be interpreted in light of the population from which they were derived.

3. The norms for the Alberta Special Games should be revised as the need arises.

4. Further studies should attempt to determine a relationship between scores in events in which an individual participates.

5. The classification system should be more clearly defined with regards to the level of competence of the participants.

6. The classification system should be refined in terms of the age groups.

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